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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0 2-F-0 0 2 PCT		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/JP 02/13183	International filing date (day/month/year) 17.12.2002	Priority date (day/month/year) 17.12.2002	
International Patent Classification (IPC) or both national classification and IPC B01J23/50			
Applicant JAPAN SCIENCE AND TECHNOLOGY AGENCY et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the opinionII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input checked="" type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input type="checkbox"/> Certain defects in the international applicationVIII <input type="checkbox"/> Certain observations on the international application			
Date of submission of the demand 30.01.2004		Date of completion of this report 11.03.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Holzwarth, A Telephone No. +49 89 2399-7269	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP 02/13183

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-14 as originally filed

Claims, Numbers

1, 2, 4-24 received on 03.06.2004 with letter of 03.06.2004

Drawings, Sheets

1/20-20/20 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☒ the claims, Nos.: 3
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:
- ☒ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☐ not complied with for the following reasons:
4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
- ☒ all parts.
 - ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-24
	No: Claims	1
Inventive step (IS)	Yes: Claims	
	No: Claims	2-11, 21-22
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

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Re Item IV

Lack of unity of invention

The application now is unitary (Rule 13.1 PCT)

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP-A-0764489

D4: GB-A-1 074 018 (ERDOELCHEMIE GMBH) 28 June 1967 (1967-06-28)

D5: US-A-5 958 367 (ANTONELLI DAVID M ET AL) 28 September 1999 (1999-09-28)

D6: US-A-4 797 267 (KUEHL GUENTER H) 10 January 1989 (1989-01-10)

1. The claims do not comply with the requirements of Art. 6 PCT, because of the following reasons:

1.1 The term "metal oxide salt material" in claim 12, 13, 14 is not clear.

1.2 The term "highly" in claim 12, 13, 14 is a vague relative term and will therefore be disregarded in the following.

2. The present application does not comply with the requirements of Art. 33 PCT, because of the following reasons:

2.1 D1 (page 3, lines 5-23 and 53-57; figures 1, 10 A, 10B; page 4, lines 39-56; page 6, lines 5-21; example 1; tables 3,4) discloses sponge-like materials. The structure of the porous materials according to D1 (figures 1, 10A) and of the comparative examples in D1 (figure 10B, comparative examples 1,2) look quite similar to the present invention, being composed of rods, which construct an open framework architecture.

Furthermore it is not clear what the advantage is of materials prepared by the process of the present application, as far as the product is concerned.

Therefore the subject matter of at least the claim 1 is not novel in view of D1.

2.2 D5 (column 2, lines 56-60; column 3, lines 29-37; column 7, lines 41-57; column 8, lines

36-47) discloses a porous hexagonally-packed metal oxide material, with rod-shaped crystals. D6 (column 1, lines 15-24; figures 8a, 8b; examples 19,20) discloses a preparation procedure for rod shaped ZSM-5 zeolite crystals. These zeolites are porous and contain aluminum oxide (a metal oxide). The materials in D5 and D6 are porous and can therefore be viewed as "sponge-like material" in the sense of claim 1 of the present application.

Therefore the subject matter of at least the claims 1 is not novel in view of D5 and D6.

2.3 Dependent claims 2-11 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the EPC with respect to novelty and/or inventive step, because said additional features are either disclosed in the prior art documents (see above) or are trivial or within the competence of a skilled person looking for alternative materials.

2.4 D4 (column 1, line 38- column 3, line 18; example 1; claims 1-8, 10) disclose porous metals or porous metal oxides, which are sponge materials. D4 (example 1) also discloses specifically, that these materials are suitable as a silver catalysts.

Therefore the subject-matter of claims 21-22 does not involve an inventive step in the sense of Article 33(3) PCT with respect to a combination of D1 and D4.

3. D1 (page 3, lines 5-23 and 53-57; figures 1, 10 A, 10B; page 4, lines 39-56; page 6, lines 5-21; example 1; tables 3,4) discloses a preparation procedure for porous metals, which are sponge materials, wherein a mixture including a metal powder and a water soluble resin binder, which maybe a highly **water soluble carbohydrate polymer** (example 1; page 4, lines 50-35) is dried and subsequently baked.

The main difference of claims 12, 13 and 14 to D1 is, that in D1 metal powders are used, which are not water soluble and do not form colloidal solutions.

As the application describes an alternative process for the preparation of sponge-like materials and inventive step can be recognized for the subject matter of claims 12, 13 and 14 and their dependent claims.

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Claims:

1. (Amended) A metal or metal oxide porous material comprising rod-shaped crystals of a metal or metal oxide, which construct an open framework architecture, thereby forming a sponge-like material.
2. (Amended) The metal or metal oxide porous material of claim 1, which is a soft or hard sponge-like material, depending on its preparation conditions.
3. (Cancelled)
4. (Amended) The metal or metal oxide porous material according to anyone of claims 1 or 2, wherein the cross-sectional dimension of the rod-shaped crystal, taken in a direction perpendicular to the length-wise direction, is between 1 μ m to 50 μ m depending on its preparation conditions.
5. (Amended) The metal porous material according to anyone of claims 1, 2 and 4, wherein the metal is selected from the group consisting of noble metals and transition metals.
6. The metal porous material according to claim 5, wherein the noble metal is silver or gold.
7. (Amended) The metal porous material according to anyone of claims 1, 2 and 4, wherein the metal is composed of more than one type of metal element.
8. (Amended) The metal oxide porous material according to anyone of claims 1, 2 and 4, wherein the metal oxide is selected from transition metal oxides.
9. (Amended) The metal oxide porous material according

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to claim 8, wherein the transition metal oxide is iron oxide.

10. (Amended) The metal oxide porous material according to anyone of claims 1, 2 and 4, wherein the metal oxide is composed of more than one type of metal oxide.
11. (Amended) The metal or metal oxide porous material according to anyone of claims 1, 2, 4 to 10, which further comprises particles of a different type of metal element or metal oxide on its surface.
12. (Amended) A method for preparing the metal or metal oxide porous material of anyone of claims 1, 2, 4 to 10, which comprises:
preparing an aqueous viscous solution of metal or metal oxide salt material and dextran or a highly water soluble carbohydrate polymer;
allowing said aqueous viscous solution to self-solidify to form a solid matter; and
baking said solid matter.
13. (Amended) A method for preparing the metal or metal oxide porous material of claim 11, which comprises:
preparing an aqueous viscous solution of metal or metal oxide salt material, dextran or a highly water soluble carbohydrate polymer, and a different type of metal or metal oxide salt material;
allowing said aqueous viscous solution to self-solidify to form a solid matter; and
baking said solid matter.
14. (Amended) A method for preparing the metal or metal oxide porous material of anyone of claims 1, 2, 4, 8 to 10, which comprises:

preparing an aqueous viscous solution of colloidal metal oxide particles and dextran or highly water soluble carbohydrate polymer of glucose; allowing said aqueous viscous solution to self-solidify to form a solid matter; and baking said solid matter.

15. (Amended) The method according to anyone of claims 12 to 14, wherein the baking process is carried out at a temperature of not less than 500°C.
16. (Amended) The method according to claim 15, wherein the baking process is carried out at a temperature in a range from not less than 500°C up to 900°C.
17. (Amended) The method according to anyone of claims 12 to 16, wherein the carbohydrate polymer is a polysaccharide.
18. (Amended) The method according to anyone of claims 12 to 17, wherein dextran or the carbohydrate polymer in the aqueous viscous solution has a concentration in the range of 10 to 80% by weight and the metal, metal oxide salt material, or colloidal metal oxide has a concentration in the range of 10 to 90% by weight.
19. (Amended) The method according to claim 18, wherein the metal, metal oxide salt material, or colloidal metal oxide has a concentration in the range of 15 to 60% by weight.
20. (Amended) The method according to anyone of claims 14 to 19, wherein dextran or the carbohydrate polymer in the aqueous viscous solution has a molecular weight in the range of 10,000 to 500,000.

21. (Amended) A metal or metal oxide catalyst which comprises the metal oxide porous material according to any one of claims 1, 2, and 4 to 11 as at least one type of effective active component.
22. (Amended) The metal or metal oxide catalyst according to claim 21, wherein the metal is silver.
23. (Amended) The method according to anyone of claims 12 to 20, wherein the metal, metal oxide salt material, or colloidal metal oxide are added to the aqueous viscous solution in the form of nanoparticles or micro particles.
24. (New) The method according to any one of claims 12 to 20, wherein the aqueous solution further contains nanoparticles or microparticles of a metal, metal oxide salt material, or colloidal metal oxide.

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